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Reconciling Loss Aversion and Gain Seeking in Judged Emotions

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### Abstract

Is the pain of a loss greater in magnitude the pleasure of a comparable gain? Studies that compare positive feelings about a gain to negative feelings about a comparable loss have found many answers. The pain associated with a loss can be greater than, less than or equal to the pleasure of a comparable gain. We offer a new way to test loss aversion with emotions that gives reliable results. This method is based on the emotional reactions to the reference point, a positive change and a negative change. When we manipulate the reference point, two distinct patterns emerge. Pain surpasses pleasure (loss aversion) when the reference point is positive. Furthermore, pleasure exceeds pain (gain seeking) when the reference point is negative. A reference-dependent form of prospect theory accounts for the results. If the carriers of utility are changes from *any* salient reference point – not just the status quo – both loss aversion and gain seeking are predicted. The relative strength of emotions depends on where you start.

Keywords: Emotions, Feelings, Loss aversion, Gain seeking, Prospect theory

Loss aversion is a fundamental principle in psychology and economics that Kahneman and Tversky (1979) proposed to describe human choices. It says that the disutility of a loss is greater in magnitude than the utility of a comparable gain relative to the status quo. This principle is a feature of prospect theory's utility function that is illustrated in Figure 1. The dot is the status quo. The X-axis shows monetary amounts, and the Y-axis is utility. The utilities associated with equivalent-sized gains and losses differ; losses have greater impact than comparable gains.

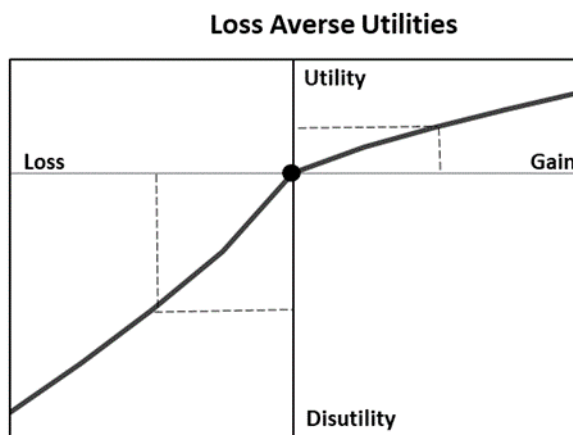


Figure 1.

Loss aversion captures many insights about human choices. For example, it explains why consumers are more sensitive to price increases than price decreases (Hardie, Johnson & Fader, 1993), and why investors hold on to stocks that decrease in value and sell those that increase. Shefrin and Statman (1983) say that, when people buy a stock, they open a mental account. If a stock goes up, people code it as a gain, so they're willing to sell it. But if the stock goes down, it is not viewed as a loss until the stock is sold and the account is closed. Hence, losers are kept and winners are sold. Numerous laboratory studies have identified empirical violations of prospect theory (Erev, Ert, & Yechiam, 2008; Harinck, Van Dijk, Van Beest, & Mersmann, 2007; Birnbaum, 2008), but it remains the dominant descriptive account of human choice.

Loss aversion is a claim about emotions as well as the utilities that describe choices. Kahneman and Tversky (1979) wrote, “The aggravation that one experiences in losing a sum of money appears to be greater than the pleasure associated with gaining the same amount.” Loss aversion implies that if people rate the pleasure of gains and the pain of comparable losses, the judged pain of the loss should exceed the judged pleasure of the gain. Researchers have conducted tests with bipolar ratings, a unidimensional scale (e.g. -5 to 5) ranging from pleasure to pain. Some evidence supports loss aversion (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Rozin & Royzman, 2001). But other evidence finds no differences between pleasure and pain (Mellers, 2000; Charpentier et al., 2016), or that pleasure can even exceed pain (Mellers & Ritov, 2010; Peters, Slovic & Gregory, 2003). What explains these inconsistencies?

McGraw, Larsen, Kahneman, & Schkade (2010) offered a solution. They argued that typical investigations ask participants to evaluate their feelings of a gain and a loss using rating scales to assess emotions. With these scales, people do not naturally compare gains to losses. Rather, they assess the strength of a gain relative to other salient gains and the strength of a loss relative to other salient losses. If given a common scale of intensity, people can compare and evaluate gains to losses.<sup>2</sup> To demonstrate, McGraw et al asked participants to consider a fair 50/50 gamble with \$200 stakes and judge the pleasure of winning \$200 and the pain of losing \$200 with bipolar ratings. The magnitudes of the responses were virtually identical – no loss aversion was observed. Then McGraw et al asked participants to directly compare the intensity of the win relative to the loss by asking participants whether the gain of \$200 would feel more, less, or equal in intensity to the loss of \$200. The majority said losses were more intense than gains. McGraw et al favored intensity comparisons

over bipolar ratings because intensity comparisons better predicted choices of whether to accept the gamble.

We provide an alternative explanation for the mixed results found with bipolar scales. An important reason why past researchers have found divergent answers is because researchers typically fail to measure feelings about the reference point. To illustrate, Berman and Mellers (2014) asked participants to rate their current affective state on a scale from -5 (Extremely Bad) to +5 (Extremely Good).<sup>3</sup> Participants then imagined they were playing a fair 50/50 gamble with \$200 stakes and rated their anticipated emotions if they won or lost \$200. Most investigators assume the reference point is “0” on the rating scale. However, only 25 of the 151 participants (17%) rated their affective state just prior to considering the gamble as “0”. The majority felt mildly positive, as shown in Figure 2.

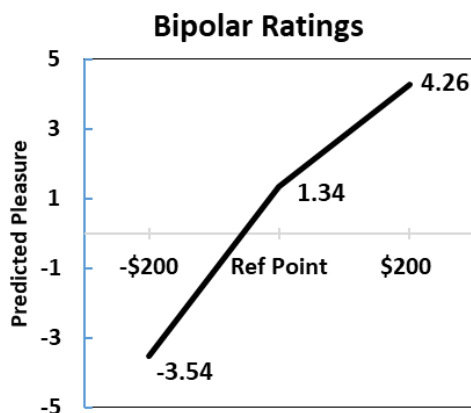


Figure 2.

Why does this matter? When Berman and Mellers (2014) computed the difference between judged emotions about winning \$200 and one’s affective state ( $4.26 - 1.34 = 2.92$ ) and compared it to the difference between judged emotions about one’s affective state and losing \$200 ( $1.34 - (-3.54) = 4.88$ ), they found evidence of loss aversion. The negative

change from the reference point (4.88) was significantly greater in magnitude than the positive change from the reference point (2.92). If Berman and Mellers had simply used that “0” as the reference point, they would have compared 4.26 to -3.54 and inferred that people were gain seeking. The pleasure of the gain was stronger than the pain of the loss. But the reference point was mildly positive. Emotions associated with the reference point are empirical values, and they are just as important as the feelings about symmetric gains and losses.

### **Measuring and Manipulating Reference Points**

We next explored loss aversion with easily quantified dimensions of life. We asked participants to assume reference points for their current salaries, commute times, average winter temperatures, and city safety indices. A city safety index is the percentage of U.S. cities found to be less safe. For each dimension, participants evaluated how they felt about the reference point. Then they evaluated emotional changes from the status quo, as follows: “Imagine that, due to circumstances out of your control, you must move. Suppose that in the new city, your commute time is 20 minutes longer. How would you feel? Suppose that in the new city, your commute is 20 minutes shorter. How would you feel?”

Next, we manipulated reference points in a between-subject design to learn whether they influence the relative effects of gains and losses. Take commute times. Some participants were asked to assume their commute took 20 minutes, which we anticipated would be evaluated positively. Others were told it was 40 minutes, which we anticipated would be evaluated negatively.

Figure 3 presents our findings. Predicted feelings are plotted against outcomes. Upper black lines show feelings when the reference point was positive (\$60k, 20 mins, 40F, and 70% Safety Index). Feelings about these reference points are the middle points in each black line. Changes around them are loss averse. That means the difference between the reference point and a negative change is greater in magnitude than the difference between the reference point and a positive change (also shown in Table 1).

Lower grey lines display judged emotions when the reference point was negative (\$20k, 40 mins, 20F, and 30% Safety Index). Again, feelings about the reference points are the middle points in each grey line. This time, changes around them are gain seeking which means that the difference between a positive change and the reference point exceeds the difference between a negative change and the reference point.

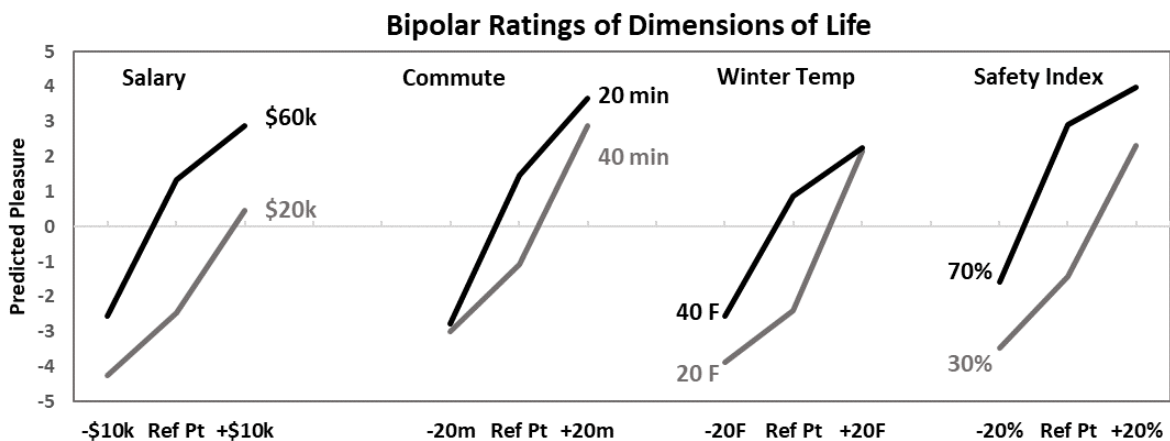


Figure 3.

By measuring and manipulating reference points, we find a novel pattern. When the reference point is pleasurable, emotional reactions to changes around them indicate loss aversion or greater pain from losses than pleasure from gains. When the reference point feels painful, emotional reactions to changes display gain seeking or greater pleasure from



gains than pain from losses. Could these results be due to ceiling and floor effects because of a constrained response scale? It seems unlikely. Only two of the eight lines even approach the endpoints of the scale. Participants could have expressed stronger emotions if they had wished.

What would have happened if we had used intensity comparisons? Two additional groups of participants compared the relative intensities of gains to losses. Questions asked, “Assume you live in a city with an average winter temperature of 40 F. Imagine that, due to reasons out of your control, you must move. Consider two situations: (1) In the new city, the average winter temperature is 20 F colder; (2) In the new city, the average winter temperature is 20 F warmer. In which situation would your emotions be stronger? <sup>4</sup>

Results in Table 1 show the percentages of participants who said losses were more intense than gains. The next column labeled Direction is the direction of the greatest changes (with statistical significance shown as stars at alpha levels of .05). These measures consistently display loss aversion, regardless of the reference point.

Table 1 also presents the bipolar ratings from Figure 3 for comparison. Loss, Reference Point, and Gain are ratings of negative changes, reference points and positive changes. The final column, Direction, shows the direction and significance of the greatest changes. When judged feelings about the reference point are positive, loss aversion appears. When judged feelings about the reference point are painful, gain seeking emerges.

**Table 1: Intensity Comparisons and Bipolar Ratings**

	Reference Point & Change	Intensity Comparisons		Bipolar Ratings			
		Percent Reporting Losses > Gains	Direction	Loss	Reference Point	Gain	Direction
Positive Reference Points	\$60k Salary (+/- \$10k)	75%	LA*	-2.55	1.33	2.89	LA*
	20 Minute Commute (+/- 20 min)	58%	LA*	-2.78	1.46	3.68	LA*
	Avg. Winter Temp 40F (+/- 20F)	63%	LA*	-2.57	0.88	2.25	LA*
	City Safety Index (70%) (+/- 20%)	72%	LA*	-1.57	2.97	3.98	LA*
Negative Reference Points	\$20k Salary (+/- \$10k)	63%	LA*	-3.88	-2.39	2.16	GS*
	40 Minute Commute (+/- 20 min)	82%	LA*	-3.45	-1.43	2.31	GS*
	Avg. Winter Temp 10F (+/- 20F)	81%	LA*	-4.25	-2.46	0.47	GS*
	City Safety Index (30%) (+/- 20%)	59%	LA*	-3.99	-1.08	2.89	GS*

### An Explanation of Loss Aversion and Gain Seeking

What theoretical accounts describe intensity comparisons? This remains unclear. But we can explain the loss aversion and gain seeking with a reference-dependent version of prospect theory. Prospect theory asserts that losses have greater impact than equivalent gains when evaluated relative to the status quo (Figure 1). Suppose the carriers of utility were changes from any salient reference point.<sup>5</sup> Figure 4 illustrates this reference-dependent theory. The X-axis is monetary amounts, and the Y-axis shows utilities. When the reference point is in the gain domain (upper right), the theory predicts loss aversion. The distance between the loss and the reference point is greater than the distance between the gain and the reference point. But when the reference point is in the loss domain (lower left), the theory predicts gain seeking. The distance between the gain and the reference point exceeds the distance between the loss and the reference point. By this account, loss aversion and gain seeking can both occur if the reference point can shift away from the status quo.

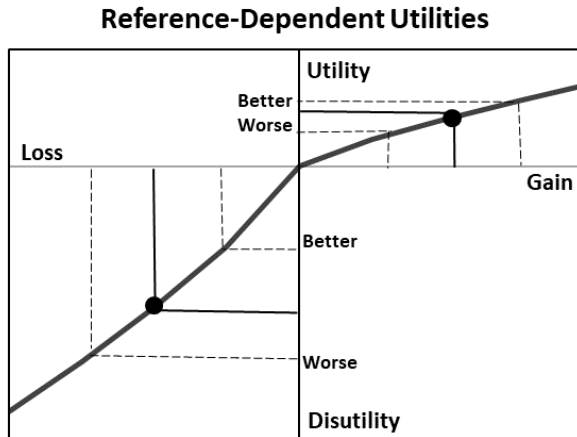


Figure 4.

Kahneman and Tversky (1979) noted that change in the reference point could affect choices. For example, people might find themselves in the loss domain at the racetrack. Suppose they lost \$100. They may predict that the pleasure of winning back the \$100 would be stronger than the pain of losing another \$100. If people had not made peace with their loss, they might be risk seeking from the anticipated pleasure of gains relative to the pain of losses.

### Expectations as Reference Points

Reference points can take many forms. If the reference point is an expectation or aspiration level, do the same patterns emerge? We used the same design as before with aspects of life but, this time, examined expectations and goals. Expectations were grades and prices of products. Grade questions said, “Imagine you are a student taking a challenging course. You just took the final exam and you are expecting to get a B in the course. How do you feel about it? Suppose that, instead of a B, you receive an A. How would you feel? Now suppose that, instead of a B, you receive a C. How would you feel?” Expectations about prices were ear phones that cost either \$120 or \$310, with \$30 changes for both reference

points. Finally, personal goals were about exercising. Goals were either 7 or 27 sit-ups, with 5 sit-up changes in both directions. The same positive and negative changes were used with each set of reference points.

We soon learned that participants differed greatly in their feelings about obtaining expected outcomes. For instance, most students felt that a grade of a B was positive (89%), a few felt it was neutral (3%), and some felt it was negative (8%). Compared to status quo reference points, affective responses to expectations were harder to predict a priori. Therefore, we sorted respondents according to the sign of their feelings about obtaining the reference point. Table 2 shows the proportions of participants whose responses were positive, neutral and negative for grades, exercises and expected prices of products.

**Table 2: Percentages of Different Feelings When Outcome is Expected**

	Grades				Exercises				Prices		
	Pos	Neutral	Neg		Pos	Neutral	Neg		Pos	Neutral	Neg
Expect B	89%	3%	8%	27 Sit-ups	94%	2%	4%	\$120	29%	10%	61%
Expect D	11%	8%	81%	7 Sit-ups	86%	10%	4%	\$310	9%	5%	86%

Figure 5 shows predicted feelings against outcomes for those with positive and negative feelings about the reference point. We exclude neutral feelings for simplicity. Expected grades are on the left, exercise goals in the center, and expected prices on the right. Upper black lines represent responses of those who anticipated pleasure from the expected outcome (+), and grey lines show those who anticipated pain (-). When the reference point is pleasurable, loss aversion occurs. When the reference point is painful, gain seeking emerges. Similar patterns of loss aversion and gain seeking appear when reference points are either expectations (Figure 5) or the status quo (Figure 3).

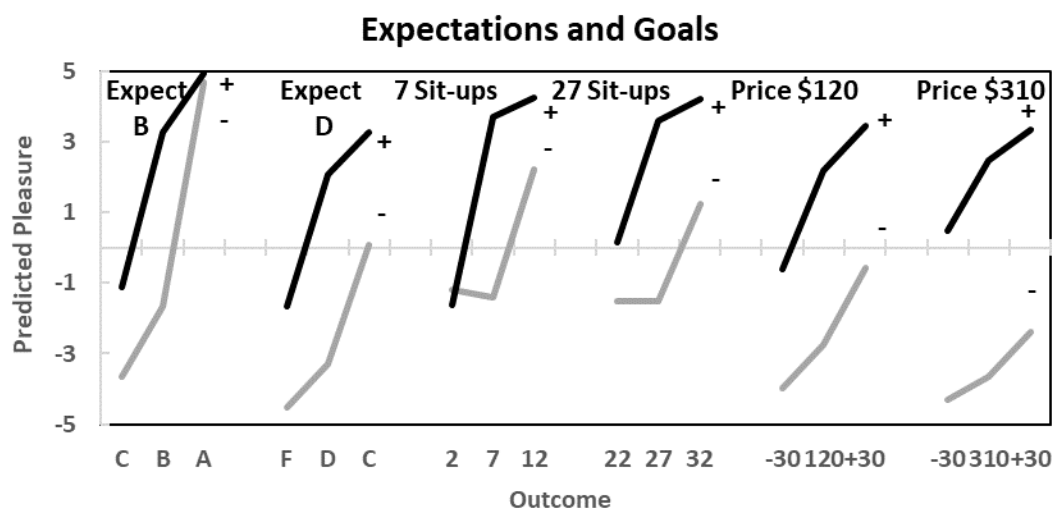


Figure 5.

### Emotions in Markets

Next, we used our method to explore hedonic loss aversion in a behavioral economics context. The endowment effect is the finding that selling prices are often higher than buying prices for a good, even in a laboratory where economic theory predicts they should be identical (Kahneman, Knetsch & Thaler, 1991). In endowment studies, researchers conduct experimental markets and randomly assign participants to the roles of buyers or sellers. Sellers are given a good, and buyers are allowed to purchase it. Sellers set their selling prices and buyers decide their buying prices. Economic theory says that, due to the random assignment of people to groups, buying and selling prices should be equal on average. But selling prices are consistently higher than buying prices.

Kahneman, Knetsch and Thaler (1991) suggested that sellers viewed the exchange as a loss, and buyers viewed it as a gain. Sellers demanded more from their anticipated the pain of a loss. Several other accounts have been proposed, including information processing (Carmon &

Ariely, 2000; Johnson, Häubl, & Keinan, 2007), contextual effects (Walasek & Stewart, 2015), inertia (Gal, 2006) and reference prices (Weaver & Frederick, 2012).

Weaver and Frederick suggested that prices depend not just on how much buyers and sellers value the good, but also on the reference price (or a salient price of the good). Suppose buyers and sellers value a good at \$3. In one market, the reference price is \$1, and in another, it is \$5. In the market with a \$1 reference price, buyers will not pay \$3, since \$3 would be a bad deal. Selling prices will be higher than buying prices. In the market with a \$5 reference price, sellers will demand more than \$3 to part with their goods because a \$3 would be a bad deal. Again, selling prices will be higher than buying prices.

We conducted three experimental markets, manipulated reference prices and measured prices and emotions about exchanges. Participants were randomly assigned to groups of buyers or sellers. Sellers were given a good, and buyers could purchase it. In one market, the good was a bag of Lindt candy, and participants were told the actual cost of \$4.95. In the other markets, the good was a package of gel-pens costing \$11.99, but participants were told the price was either \$5.95 or \$19.95. Sellers reported minimum selling prices, and buyers stated maximum buying prices. Both groups judged their feelings about an exchange at their offered price, three better prices, and three worse prices. Then we set the market price and conducted exchanges.<sup>6</sup> Table 3 shows that selling prices were significantly higher than buying prices. Moreover, buying and selling prices in the pens markets varied with the reference price, as predicted by reference price theory.

**Table 3. Buying and Selling Prices in Three Markets with Reference Prices**

	<u>Candy \$4.95</u>	<u>Pens \$5.95</u>	<u>Pens \$19.95</u>
Buying Prices	\$3.99	\$4.57	\$6.22

Selling Prices

\$5.71

\$6.20

\$14.98

How did people feel about exchanges in the market? Figure 6 displays buyers' and sellers' feelings when their reference points were the prices they offered (i.e. buying and selling prices). The first panel shows results from the candy market. Selling prices are solid lines, and buying prices are dashed lines. Feelings about exchanges at offered prices appear where the lines cross. Both groups felt positive about a trade at the offered prices. Most important, lines showing buyers and sellers feelings had significant kinks at the reference points; the pain of a worse price was greater in magnitude than the pleasure of a better price.

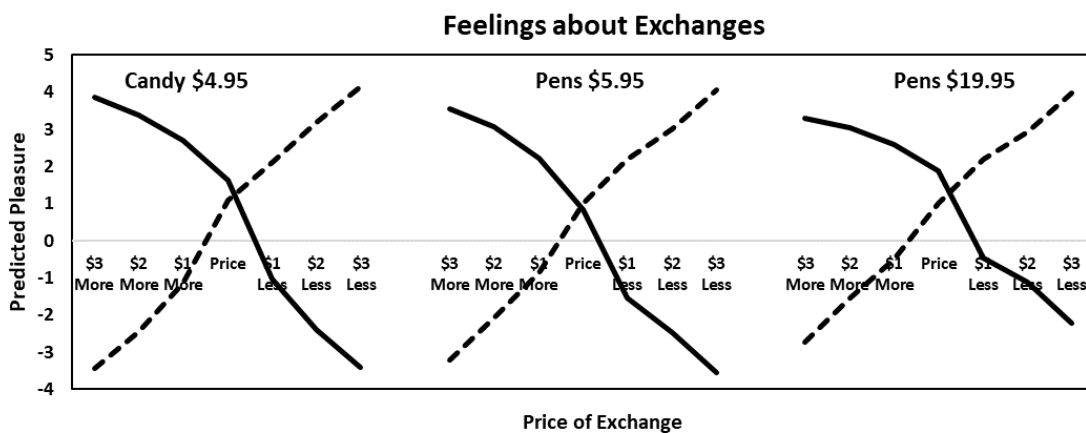


Figure 6.

The second and third panels show markets for pens. Again, buyers and sellers felt pleasure about making an exchange at their offered price, and both groups show loss aversion. Slopes of the lines are significantly greater below the reference point than above it. Sellers display loss aversion in all markets, and buyers show loss aversion in all but the \$19.95 market for pens.

The reference-dependent form of prospect theory describes hedonic loss aversion in these markets. For both groups, reference points are positive and these reference points are associated with loss aversion. If we had assumed the reference points were “0”, buyers and sellers would appear to be gain seeking with greater pleasure from a good deal than pain from a bad deal. However, once we measure feelings about the reference point, loss aversion emerges.

## **Discussion**

To understand whether the pain of a loss surpasses the pleasure of an equivalent gain, we believe the standard bipolar scale of emotions can be used, but it requires a procedure that measures the emotions associated with the reference point, a positive change and a negative change. With this method, people tend to be loss averse when reference points are pleasurable and gain seeking when reference points are painful. A reference-dependent version of prospect theory that allows the carriers of utility to be changes from *any* salient reference point predicts both patterns, regardless of whether reference points are the status quo, expectations, or personal goals. It also predicts the emotions that traders experience in the market.

Pleasure and pain are likely shaped by natural selection. Some argue that loss aversion makes evolutionary sense if survival depends on avoiding negative experiences (McDermott et al. 2008; Zamir, 2015). More pain from losses than pleasure from gains would ensure precaution and restraint. When living with enough, we have less need to take risks. But greater pleasure from gains than pain from losses should promote risk seeking and motivate change. These anticipated asymmetries in emotions are likely to drive prevention and promotion (Higgins, 1997). Both pleasure and pain can promote survival and fitness; it all depends on the reference point.



## Footnotes

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<sup>2</sup>McGraw et al. (2010) said that people could express how much more intense one outcome was than the other. They used a 3-point and a 9-point rating scale of relative intensity. For simplicity, we use a binary response.

<sup>3</sup>In all studies with bipolar ratings, we used the same response scale of -5 (Extremely Bad) to 5 (Extremely Good).

<sup>4</sup>Participants made intensity comparisons using a forced-choice method with 2 responses. McGraw et al allowed indifference as a 3<sup>rd</sup> response.

<sup>5</sup>A related theory was proposed by Rabin (2007).

<sup>6</sup>We set the market price by drawing the supply and demand curves for participants and showed them where the curves intersected. Of the 120, 70, and 62 buyer-seller pairs in the \$5.95 pen market, the \$19.95 pen market and \$4.95 candy market, there were 47, 23 and 27 exchanges. In all markets, exchanges were less than 50%.

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## Recommended Readings

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). The endowment effect, loss aversion, and the status quo bias. *Journal of Economic Perspectives*, 5, 193–206.

McDermott, R. Fowler, J. & Smirnov, O. (2008). On the evolutionary origin of prospect theory preferences. *Journal of Politics*, 70, 335–350.

Mellers, B. A. (2000). Choice and the relative pleasure of consequences. *Psychological Bulletin*, 126, 910–924.

### Figure Captions

Figure 1. Illustration of prospect theory's utility function with the reference point at the origin. Loss aversion implies that the slope of the utilities is steeper in the loss domain than in the gain domain.

Figure 2. Emotional ratings of the reference point or affective state prior to the gamble, winning \$200 and losing \$200. Results show loss aversion when the reference point is measured (1.34) and gain seeking when it is assumed (0).

Figure 3. Feelings about life changes. Upper black lines reflect judgments with pleasurable reference points, and lower grey lines represent judgments with painful reference points. Upper lines show loss aversion, while lower curves indicate gain seeking.

Figure 4. A relaxed version of prospect theory's utility function with utility on the Y axis and changes along a dimension on the X axis. Black dots show positive and negative reference points. Green and red segments indicate the magnitudes of utilities associated with positive and negative changes, respectively. When the reference point is positive, loss aversion is predicted. When the reference point is negative, gain seeking emerges.

Figure 5. Feelings about expectations and goals. Upper black lines represent participants who said that the expected outcome was pleasurable (+). Dashed lines are those who said that achieving the expected outcome was neutral (0), and the lower grey lines are participants who reported that the expected outcome was painful (-). Upper black lines show loss aversion, and lower grey lines indicate gain seeking.

Figure 6. Bipolar ratings about exchanges in the candy and pen markets. Solid lines are sellers and dashed lines are buyers. Both groups feel greater pain about bad deals than pleasure about comparable good deals.

### Table Captions

Table 1: Note: Reference points and changes are presented with intensity comparisons. These are proportions of participants who said losses were more intense than gains. Direction is the, direction with greater magnitude and the significance (indicated with stars). Bipolar ratings are shown under Loss, Reference Point and Gain. The last column is the direction of greater magnitude and significance of the corresponding ratings. City Safety Index refers to the percentage of U.S. cities that are less safe.

Table 2: Proportions of participants who felt positive, neutral or negative about achieving the expected outcome.

Table 3: Buying and selling prices in three markets with reference prices.